

peared between the upper and lower portions. Telephone messages afterwards received from points to the southeast, such as Moorhead, distant 15 miles, and from Ute, which is 20 miles east of Onowa, and from Blencoe, 8 miles south, state that the waterspouts, whirlwinds, or tornadoes were seen by all, causing much uneasiness, but no damage was experienced, and also that for a long time, one of the two threatening clouds remained stationary over a lake about 3 miles southeast of Turin, which is itself 7 miles east of Onowa, and that it drew a supply of water up from the lake, sucking up also, fish, frogs, worms, and vegetable matter, all of which were afterwards dropped back in that locality.

WEATHER BUREAU MEN AS INSTRUCTORS.

Among the replies to circular letter of March 4 are the following: Mr. R. G. Allen, Section Director, Ithaca, N. Y., says:

Prof. R. S. Tarr, of Cornell University, has for several years given a course in elementary meteorology, covering the first half of each collegiate year. For the last three years I have assisted in this course, giving instruction in what is termed the "laboratory work," which consists of practise work in making weather maps and forecasts, climatic charts, and observations of instruments and record sheets. Professor Tarr's work consisted of lectures and recitations.

During the first year of this work I had no official connection with Cornell University, but during the two last years I have been officially appointed as "assistant in meteorology," at a salary of \$200 for the half term of four months, or about \$50 per month. It was understood that I was to give two and one-half hours a week, which was all that was necessary the first year with a class of 27 students, but with a class of about forty-eight students last year, divided into five sections, in addition to a few stragglers and football men, who were continually coming in to make up back work, it required about ten hours a week, which I can not spare and properly perform my Weather Bureau work. Accordingly I have informed Professor Tarr that it will be impracticable for me to assist him next year. He has decided that he can not continue the work, on account of the increasing size of the class, and it will be dropped next year, unless the University, provides for a regular course in this subject.

Referring to a previous report by Mr. R. G. Allen, Section Director, we note that he assisted Professor Tarr in his class in elementary meteorology about ten hours each week during the first half of the collegiate year 1902-3. There were about forty or fifty pupils, including the freshmen of the college of forestry, and also a few elective students. This work was very agreeable and appropriate, but was difficult to handle in addition to the numerous and exacting duties necessary to administer the large Climate and Crop section center. Two of the class of 1901-2 took additional work leading up to work in the Weather Bureau, during the year 1902-3, one of whom secured an appointment in the Bureau in less than ten days after graduation, and the other is on the eligible list, with a rating above 80. The appointee referred to was able to take up station work immediately on arriving at his first station, and the other, in case of appointment, will be able to do the same.

In connection with the relinquishment of meteorology as a part of the course in geology, Mr. R. G. Allen reports under date of July 18 that he has consulted with Professor Bailey, Dean of the College of Agriculture, relative to a proposed course of instruction in that college, and the following item has been added to the agricultural course conformably with the desire of the Chief of Bureau:

Course No. 72.—Agricultural meteorology and climatology, second half-year, three hours a week, lecture and laboratory, Mr. Allen.

Mr. Allen adds:

I will undertake during the next five or six months to prepare for this extra work and any suggestions or information that can be used in outlining the course and work will be duly appreciated. There is to be no remuneration for this work, and my time is already well taken up, but I shall endeavor to carry out the wishes of the Central Office.

Mr. G. A. Loveland, Section Director, Lincoln, Nebr., writes as follows:

I am at the present time, and have for the past three years, been teaching meteorology in the University of Nebraska. I have been elected by the regents of the University a member of the faculty, with the title of instructor of meteorology, for each of the past three years, and suppose

that I am to be considered as a permanent member of the faculty within the meaning of the circular. No salary is paid me, but an allowance of \$60 per year is made for equipment and student aid in experiments and correcting exercises.

The number of students during the past three years has increased from 5 at the beginning to 29 at the present time. Two courses are given; one where the class meets 17 times and one where the class meets 51 times. The shorter course is necessarily a very brief survey of the subject, given principally in lectures with Waldo's Meteorology as a consulting text-book. The longer course is given in the spring semester and treats the subject much more completely, and especially that phase which is useful to agricultural students.

At one period during the year a brief lecture of about twenty minutes on the subject of meteorology was given at the convocation hour in the University chapel, a general meeting place of the students.

In this connection it may be proper to state that it is expected that a new building, to be devoted to physics, will be built on the campus during the coming year and it is the present plan to include adequate accommodations for the Weather Bureau office, also laboratory and recitation rooms for instruction in meteorology.

Mr. J. R. Weeks, Observer, Weather Bureau, Macon, Ga., reports a lecture on the weather to pupils of the Winship School, June 19, 1903.

Many persons are watching with interest the efforts made by the officials of the Weather Bureau to respond as far as practicable to the great demand that is being made for instruction and lectures in meteorology. It is undoubtedly the policy of the Bureau to contribute as much as possible to an enlightened appreciation of the difficulties experienced by the meteorologist and to educate the community in the fundamental principles of the science that is so frequently misunderstood. The notes that we have recently published showing the activity of the Weather Bureau men as instructors and especially the reports from the men engaged in our larger colleges, show that an immense amount of work is being done willingly and faithfully, but also gratuitously, so far as the colleges and universities are concerned. There seems to be everywhere a recognition of the need for instruction and of the demand for education, but no recognition of the fact that the instructor should be properly paid for his work. Congress has not made it a specific duty of Weather Bureau officials to give instruction in colleges, as it has done in the case of army officers, who are assigned by the President for a term of years as instructors in military affairs, and are for the time being relieved from all other duty. The instruction given by the Weather Bureau officials is additional to their eight hours per day of Government work and it is very surprising that they should be able to do all this extra work with satisfaction to the colleges, in view of the high demands made by modern educators. We suppose that as long as the colleges and their students can get such satisfactory work at little or no expense, they will continue to do so; but we must submit to the friends of education that professorships of meteorology should be endowed and Weather Bureau men be given an opportunity of resigning from their present duties and devoting themselves wholly to instruction and the building up of schools of meteorology.—C. A.

LUNAR RAINBOW.

Mr. T. S. Outram, Section Director, of Minneapolis, Minn., forwards an account by Mrs. Peoples, of Detroit City, Minn., describing a lunar rainbow seen on the face of the cloud, following a shower, during the evening of July 9, 1903. The moon was nearly full and near the zenith at 9:55 p. m. The rainbow was formed among the raindrops of a shower bearing northwest from the station.

THE CLIMATE AND THE SUGAR BEET.

Dr. H. W. Wiley, Chief of the Bureau of Chemistry, U. S. Department of Agriculture, has recently published a new con-

tribution to the study of the influence of soil and climate on the composition of the sugar beet (Bulletin No. 74 of the Bureau of Chemistry), from which we abstract the following items. This study refers to the weather of the growing season of 1901. The experiments were made at Washington, D. C.; Lafayette, Ind.; Ames, Iowa; Lexington, Ky.; Lansing, Mich.; Geneva and Ithaca, N. Y.; Logan, Utah, Blacksburg, Va., and Madison, Wis. The soils at these stations were examined as to their physical and other characteristics, and with respect to these Dr. Wiley says:

While it is doubtless true that the character of the soil influences to a greater or less degree the quality of some crops, yet it is certain that in the case of the sugar beet its principal influence is exerted almost exclusively upon the magnitude of the crop.

And again:

It is evident that while the texture of the soil, as shown by the mechanical analysis, undoubtedly has a direct bearing on the yield per acre, it has practically no effect on the content of sugar in the beet. This is also true of the chemical properties of the soil.

As regards latitude and sunshine it may be said that with one exception, viz, Blacksburg, Va., at an altitude 2100 feet, the sugar content and the latitude seem to increase and decrease together. With regard to sunshine, the percentage of possible sunshine seems to have but little effect upon the sugar content, and it appears to be well established that the chemical activities of the sun's light in promoting the condensation of carbo-hydrate molecules in the chlorophyll cells are not notably diminished by filtration through aqueous vapor. As regards the distribution of sunshine, it must be said that the actual predominance of clear days is not to be reckoned as an important factor, except in so far as it may indicate drought, and thus interfere with the magnitude of the crop; thus the large number of clear days at Ames was accompanied by excessively dry weather. The relation between the average length of the day and the sugar in the beet is most interesting; in general the percentage of sugar increases with the length of the day. This is in harmony with the commonly accepted theory of the correlation of the functional activity of the chlorophyll cells and the light of the sun. Under the same general conditions, it is evident that the longer the hours of activity, the greater the amount of work accomplished; hence, with longer hours of daylight, the greater the quantity of carbo-hydrates that is formed.

As regards temperature, it is evident that the tendency of

the sugar is to diminish as the temperature increases, but in general, the percentage of sugar in the beet increases with the coefficient of purity of the juice.

The chart showing the percentage of sugar in the beet, the altitude of the station, and the rainfall shows the remarkable effect of the altitude of the Blacksburg station. It is the altitude that has secured for this station the highest content of sugar in the beet. At the Washington station the lowest altitude coincides with the lowest percentage of sugar.

The absolute amount of rainfall does not have so great an influence on the composition of the beet as does its distribution. Give a sufficient quantity of water to secure normal growth, the beet is not very sensitive to a slight diminution or increase, but it is important that the rainfall be not too great in September, which is a period of ripening, nor in October, which is the season of harvesting.

IS THE MOON'S INFLUENCE ON THE WEATHER WORTH ANY FURTHER INVESTIGATION.

Rev. F. L. Odenbach, Director of the Meteorological Observatory, St. Ignatius College, Cleveland, Ohio, writes as follows:

With reference to the rain theory of Mr. H. C. Russell, of Sydney, N. S. W., I have looked up the extensive literature on the subject extending through the two last centuries up to date. An immense amount has been written on the subject.

The sum and substance of all the work done along this line has failed to bring out anything that might be considered a law or be used as a safe rule in questions of climatology or weather forecasting.

I, myself, think that the moon (and why not the sun and the planets?) must have *some* influence on our weather. Yet this influence must be so slight, or so concealed, that all these years of observation and hard work have not resulted in anything worth considering.

The great objection I have to this new exposition of Mr. Russell is that from the start he distinguishes between the rainfall on the coast and that of the interior. Why? In this point Mr. Russell follows all of his predecessors. The rule is bolstered up with exceptions and conditions, subconditions, and special combinations until the application becomes a mere guesswork. My general impression on the subject is that about as much time has been wasted on this matter as on the "Perpetuum mobile," and with about the same success. Being in this mood I think it best not to write anything for the REVIEW, for fear lest some might take up the matter and neglect other lines of much more importance and far greater utility. Had clouds received half the attention allotted to the moon I am certain we would have derived immense benefit from that study.

I am at present spending all my spare time on this latter subject and hope that in the near future I will be able to send something for the REVIEW.

THE WEATHER OF THE MONTH.

By MR. W. B. STOCKMAN, Forecast Official, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart IV and the average values and departures from normal are shown in Tables I and VI.

The mean barometer was highest over the region from Kansas northeastward over central and western Lake Superior and northward over eastern North Dakota, with readings of 30.00 inches or slightly higher. It was lowest over the middle and southern Plateau regions, within which the lowest was 29.72 inches at Yuma.

The pressure was below the normal in southwestern New England, the Middle and South Atlantic and east Gulf States, eastern part of the west Gulf States, the Ohio Valley and Tennessee, eastern upper Lake region, lower Lake region, and the interior of the Pacific States; elsewhere it was above the normal. The greatest minus departures occurred over portions of North Carolina, and amounted to $-.10$ inch. The maximum plus departures occurred over the slope regions, Missouri Valley, northern portion of the Mississippi Valley, and North Dakota, and ranged generally from $+.10$ inch to $+.15$ inch.

Over the region from the Mississippi River westward to the

one hundred and fifteenth meridian, except in Louisiana, on the Texas coast, and in southwestern Arizona, the pressure increased over that of May, 1903, with maximum departures amounting to $+.10$ inch to $+.14$ inch, in the slope regions and North Dakota. Over the remainder of the country the pressure diminished from that of May, 1903, and as a rule the departures were more marked, in the Atlantic States north of Florida, the eastern parts of the Ohio Valley and Tennessee, eastern upper Lake region, and lower Lake region, ranging from $-.10$ inch to $-.22$ inch.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart VI.

In the Pacific States except southwestern California, Nevada, Idaho, Montana, western Wyoming, Arizona, and northeastern Minnesota the temperature was above the normal, but the departures were not very marked except in western Montana, Idaho, northern Nevada, and the eastern parts of Washington and Oregon, where they ranged from $+3.0^{\circ}$ to $+7.3^{\circ}$; elsewhere the temperature was below the normal and as a rule